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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte THADEUS SCHAUER, MARC ENTENMANN, CLAUS D.
EISENBACH, and WALDEMAR PH. OECHSNER

Appeal 2009-012874
Application 10/775,889
Technology Center 1700

Before ADRIENE LEPIANE HANLON, PETER F. KRATZ, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

KRATZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the
Examiner's final rejection of claims 1-12 and 14-20. We have jurisdiction
pursuant to 35 U.S.C. § 6.

Appellants' claimed invention is directed to a method of coating the surface of substrates, such as pigment surfaces. Solvolysis is employed to reduce the solubility of the coating polymer in the presence of the substrates and to cause deposition of the polymer on the substrate surface by more than mere adsorption (Spec. 2). For example, titanium dioxide particles can be coated, *in situ*, by a solvolysis reaction involving the conversion of polyvinyl acetate to polyvinyl alcohol using an isopropanol/ethanol mixture as the medium (Spec. 7, Ex. 1). Potassium hydroxide is added to the medium (*id.*).

Claims 1 and 18 are illustrative and reproduced below:

1. A method of coating the surface of substrates, comprising the steps of:

bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and

converting the polymer to a polymer form that is less soluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a solvolysis reaction; and

thereby depositing the less soluble polymer form on the surface of a substrate in a manner involving more than just adsorption on the surface of the substrate.

18. A method of coating the surface of substrates, comprising the steps of:

bringing a solution of a polymer having derivatized hydroxyl and/or carboxyl groups and/or CN, halogen, and/or amino substituents in a solvent into contact with the surface of the substrate; and

converting at least a portion of the polymer to a polymer form that is insoluble in said solvent by subjecting said derivatized hydroxyl and/or carboxyl groups or CN, halogen and/or amino substituents to a kinetically controlled solvolysis reaction and thereby depositing the insoluble polymer

form on the surface of a substrate in a manner involving more than just adsorption on the substrate surface.

The Examiner relies on the following prior art references as evidence in rejecting the appealed claims:

Cox	3,393,162	July 16, 1968
Herman	3,884,871	May 20, 1975
Tuyt (Stamicarbon) ¹	NL 7714035	Jun. 21, 1979
Bugnon	EP 0528602 A1	Feb. 24, 1993

Emmanuelle Marie et al., *The Controlled Solvolysis of Ethylene—Vinyl Acetate Copolymers in*, 34 Macromolecules 5838-5847(2001).

K. Noro et al., *Polyvinyl Alcohol-Properties and Applications* 91-120 (C.A. Finch ed., 1973).

“Addition Polymerization” in, 1 Encyclopedia of Polymer Science and Engineering 470-71 (John Wiley & Sons, 1973).

The Examiner maintains the following grounds of rejection²:

Claims 1, 3, 4, 5, 7, 8, 10, 12, 14, and 16 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Bugnon. Claims 1, 3, 4, 5, 7, 8, 10, 12, 14, and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro. Claims 17-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and Stamicarbon. Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Marie. Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and Marie. Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon

¹ We refer to Tuyt as Stamicarbon to be consistent with the Examiner.

² A rejection under 35 U.S.C. § 112, first paragraph was withdrawn by the Examiner (Ans. 2).

in view of “Addition Polymerization”. Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and “Addition Polymerization”. Claims 9 and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon and Cox. Claims 9 and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and Cox. Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Herman. Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and Herman.³

We reverse the anticipation rejection and the separate obviousness rejections that do not rely on Noro. We affirm the remaining obviousness rejections. Our reasoning follows.

Anticipation Rejection

To anticipate under § 102, the prior art reference “must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements arranged as in the claim.” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (citation and internal quotation marks omitted). “It is well settled that a prior art reference may anticipate when the claim limitations not expressly found in that reference are nonetheless inherent in it. Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates.” *In re Cruciferous Sprout*

³ The Examiner includes claim 13 with claim 11 as being rejected; however, claim 13 is a cancelled claim. *Compare* the Answer with the Appeal Brief (Ans. 11-13; Br. 11, 15, and Claim Appendix; *see* Amendment filed Nov. 01, 2007).

Litig., 301 F.3d 1343, 1349 (Fed. Cir. 2002) (citations and internal quotation marks omitted). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (citations and internal quotation marks omitted).

The Examiner maintains that (Ans. 3-4):

Bugnon discloses coating the pigment with a polyvinyl alcohol by forming the polyvinyl alcohol by a solvolysis reaction of a vinyl acetate polymer and pigment dispersion (Page 2, lines 35-38). Bugnon discloses dispersing a pigment in a solution of a polymer to provide coating onto the pigment (Page 2, line 56-Page 3, line 8).

Bugnon process describes:

- (1) bringing a solution of a PVAc in an organic solvent
- (2) subjecting the PVAC to a solvolysis reaction to form PVOH
- (3) coating the surface of a substrate.

Each of the preceding steps are required by the claims as written. Specifically, the specification on page 3 and Example 1 discloses the polymer derivative is preferably PVAc, the preferred deposited polymer includes PVOH and the solvent is usually an organic solvent. Therefore, while appellants conten[d] that Bugnon only discloses adsorption, Bugnon discloses the same process steps as claimed by the appellant using the same or substantially similar materials. Therefore, it is unclear, from the claims as written how the appellant is achieving this "precipitation" and Bugnon fails to achieve the same. Since the prior art and the present claims, reflected by claim 1, teach all the same process steps using the same materials as defined by the appellants specification and examples, the results obtained by appellants process must necessarily be the same as those obtained by the prior

art. Therefore by performing the 3-step process above, it must necessarily result in a less soluble form of the polymer. Either 1) the appellant and the prior art have different definitions for various, or 2) the appellant is using other process steps or parameters or specific combinations of materials that are not shown in the claims.

On the other hand, Appellants argue that (App. Br. 7):

Bugnon does not disclose deposition of a polymer onto a substrate by means of a solvolysis reaction as is recited in the appealed claims. Rather Bugnon teaches that the conversion of PVAc to PVOH is a hydrolysis reaction, which means that the reaction is carried out in the presence of water. However the reaction product of this hydrolysis reaction (PVOH) is soluble in water. Accordingly, hydrolysis of PVAc to PVOH would not result in the PVOH being deposited on the surface of a substrate as recited by the appealed claims, because the PVOH would continue to be soluble in the aqueous solvent. Thus nothing in Bugnon teaches or suggests that a polyvinyl alcohol formed by hydrolysis of a vinyl acetate polymer would be less soluble than the parent vinyl acetate polymer such that formation of the polyvinyl alcohol polymer resulting in it "thereby" being deposited on the surface of a substrate.

Here, we agree with Appellants that the Examiner has not established that Bugnon explicitly or implicitly describes a hydrolysis (solvolysis) method for converting vinyl acetate polymer to polyvinyl alcohol in the presence of a pigment dispersion in a particular solvent under conditions wherein the polyvinyl alcohol is in a less soluble form than the vinyl acetate polymer to "thereby deposit the less soluble polymer form" on the pigment particles, as is required by the solvolysis rejected independent claim 1. In this regard, Bugnon states "[a] polyvinyl alcohol may be formed in situ by hydrolysis of a vinyl acetate polymer in a dispersion of the pigment" (p. 2, ll.

37-38). Bugnon does not otherwise specifically refer to this in situ option. Bugnon does not describe how such an alternative in situ process is conducted in a particular solvent and under particular conditions with sufficient specificity to warrant a finding that polyvinyl alcohol polymer of less solubility than the starting polyvinyl acetate is necessarily formed in the in situ conversion solvent. In this regard, the portions of the page 3 disclosure of Bugnon referred to by the Examiner for disclosing the alternative use of an organic solvent is not specifically described as being employed during an in situ hydrolysis conversion of polyvinyl acetate and under conditions such that it can be determined that a more soluble polyvinyl alcohol is necessarily formed during the previously referenced in situ conversion option (Br. 6-8).⁴

Consequently, we reverse the anticipation rejection of claims 1, 3, 4, 5, 7, 8, 10, 12, 14, and 16.

Obviousness Rejections

Concerning the obviousness rejections of claim 2 over Bugnon in view of Marie, claim 6 over Bugnon in view of “Addition Polymerization,” claims 9 and 15 over Bugnon and Cox, and claim 11 over Bugnon in view of Herman, these rejections are founded on the aforementioned anticipation position of the Examiner with respect to the formation of a less soluble form of polyvinyl alcohol in an in situ hydrolysis conversion with respect to the independent claim 1 limitation that these claims incorporate by their dependency on claim 1. The Examiner does not employ the additional cited

⁴ The Examiner has not separately addressed claim 12.

references applied against these claims to remedy the afore-discussed deficiency in the anticipation rejection. It follows that we reverse these obviousness rejections.

Obviousness Rejections utilizing Noro

However, our disposition of the remaining obviousness rejections maintained by the Examiner is another matter.

Concerning the obviousness rejection of claims 1, 3, 4, 5, 7, 8, 10, 12, 14, and 16 over Bugnon in view of Noro, Appellants argue the claims together as a group (Br. 10). Accordingly, we select claim 1 as the representative claim. Bugnon, as discussed above and in the Answer, teaches or suggests that pigment particles (substrates) can be coated with polyvinyl alcohol that is formed, *in situ*, via a hydrolysis (solvolysis) reaction with water from polyvinyl acetate. Bugnon does not specify the details as to how the solvolysis reaction can be conducted. However, the Examiner has found that Noro discloses conditions for the use of solvolysis to form polyvinyl alcohol from polyvinyl acetate and to precipitate the poly vinyl alcohol from the solvent medium; that is render the polyvinyl alcohol less soluble than the polyvinyl acetate (Ans. 6; Noro, p. 94, ll. 1-10, *see generally* Noro). Given the combined teachings of Bugnon and Noro, the Examiner has essentially concluded that it would have been obvious to one of ordinary skill in the art to select a suitable solvent, such as a lower alcohol as taught by Noro, and appropriate conditions to conduct the solvolysis/hydrolysis of the polyvinyl acetate of Bugnon in a manner that provides for precipitation of the product polyvinyl alcohol to coat the pigments, *in situ* (Ans. 6).

The principal issue here is generated by Appellants' argument that Noro does not disclose using a solvolysis reaction in connection with coating a substrate and Bugnon teaches away from the claimed process by teaching the coating of substrates (pigment particles) by adsorption of a polymer from solution or by precipitating a polymer with a precipitate salt.

We resolve this issue in favor of the Examiner's obviousness position. This is because Appellants' arguments are not persuasive of substantive error in the Examiner's obviousness determination utilizing Bugnon for teaching the use of a solvolysis reaction in connection with coating pigment particles. Noro is relied upon by the Examiner for disclosing the details as to how a solvolysis conversion can be carried out to yield a product polyvinyl alcohol polymer that is precipitated from the solution due to its lesser solubility therein.

As for the teaching away argument, we note that the fact that Bugnon discloses other embodiments without employing a solvolysis reaction wherein a polyvinyl alcohol is coated on pigment particles by adsorption and/or by employing a precipitate salt does not amount to a teaching away from the solvolysis (hydrolysis) embodiment disclosed therein. After all, "a finding that the prior art as a whole suggests the desirability of a particular combination need not be supported by a finding that the prior art suggests that the combination claimed by the patent applicant is the preferred, or most desirable, combination." *In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004).

Thus, upon consideration of the arguments of record, we determine that the Examiner has reasonably established that the combination of Bugnon and Noro would have suggested to an ordinarily skilled artisan the

option of using an, in situ, solvolysis (hydrolysis) conversion of polyvinyl acetate under conditions to form polyvinyl alcohol that is less soluble in the carrying solvent to coat the substrate pigment particles with a precipitate thereof. Consequently, we affirm the Examiner's obviousness rejection over Bugnon and Noro.

Claims 17-20

Turning to the Examiner's obviousness rejection of claims 17-20 over Bugnon in combination with Noro and Stamicarbon, we note that Appellants argue claims 17 and 20 in three separate passages with only claims 18 and 19 argued together as a group. We select claim 18 as the representative claim for the two grouped claims. We find no persuasive merit in Appellants' arguments against the Examiner's rejection of claims 17, 18, and 20.

With regard to independent claim 17, the recited coating process requires that the solvolysis reaction is kinetically controlled. The Examiner has basically found that Stamicarbon teaches or suggests that the formation of polyvinyl alcohol from polyvinyl acetate in a solvolysis reaction can be controlled with respect to the degree of conversion and consequently, the relative solubility of the polyvinyl alcohol formed (Ans. 7; Stamicarbon, 2, 3, and 6-9). This disclosure would have reasonably suggested to one of ordinary skill in the art that the amount of precipitate formation can be controlled by controlling the degree of conversion. Moreover, an ordinarily skilled artisan would have recognized that such control would have been applicable to control the solvolysis reaction of Bugnon to form precipitates for coating the pigment particles of Bugnon (Ans. 7 and 21).

Appellants repeat their argument against the combination of Bugnon and Noro, which we find unpersuasive for the reasons indicated above. In addition, Appellants maintain that Stamicarbon does not cure the deficiencies of the aforementioned combination. Appellants note Stamicarbon's teaching respecting an alkali-catalyzed solvolysis of polyvinyl alcohol to form polyvinyl alcohol ("the kinetically controlled reaction") (Br. 11). However, this teaching is argued as not being disclosed for depositing polyvinyl alcohol on a substrate surface in a controlled manner per claim 17 (Br. 11).

These arguments fail to indicate reversible error in the Examiner's obviousness rejection because Appellants have not identified a substantive deficiency in the Examiner's proposed combination of Bugnon and Noro with respect to employing Bugnon's solvolysis coating process using the solvolysis conditions taught by Noro for precipitating the formed polyvinyl alcohol, as we noted above. As for the claim 17 requirement for kinetic control of the solvolysis reaction, Stamicarbon teaches such can be achieved via catalysis, as recognized by Appellants (Br. 11), and by selection of the particular solvent and degree of conversion to polyvinyl alcohol (pp. 2, 3, and 6-9). Consequently, we are not persuaded of any substantive error in the Examiner's obviousness assessment of Claim 17. After all, one of ordinary skill in the art would have been led to control the pigment coating thickness of Bugnon to obtain the desired level of storage stability sought, as suggested by Bugnon, by controlling the solvolysis reaction given the level of skill in the art evinced by the combined teachings of the applied references. Appellants have not established that the Examiner is in error in determining that the broadly controlled solvolysis called for in claim 17

yields predictable results based on the combined teachings of the applied references (Ans. 21; *see generally* Br.).

Concerning representative claim 18, Appellants make basically the same arguments advanced above with respect to claim 17 while submitting that claim 18 further distinguishes over Bugnon by calling for the formation of an insoluble form of polymer (polyvinyl alcohol) that is deposited on the substrate (pigment particles) surfaces (Br. 11-12). However, as correctly noted by the Examiner, it is Noro that the Examiner relies upon for teaching/suggesting the solvolysis details for forming an insoluble polyvinyl alcohol by solvolysis, which is precipitated out of the solution (Ans. 21). Consequently, Appellants' argument is not found persuasive as it does not fairly address the combined teachings of the references applied by the Examiner for the reasons set forth above and in the Answer.

The rejection of claim 20 is similarly argued by Appellants with the assertion that claim 20 calls for a controlled thickness being obtained from the controlled solvolysis, which is not taught by Bugnon. Once again, Bugnon is not applied alone against claim 20 but in combination with Noro and Stamicarbon. This argument fails to indicate substantive error in the Examiner's obviousness determination for substantially the same reasons stated above with respect to the rejection of claims 17 and 18 over Bugnon taken with Noro and Stamicarbon.

It follows that we shall sustain the Examiner's obviousness rejection of claims 17-20, on this record.

Claim 2

Appellants repeat the same teaching away argument against the combination of Bugnon and Noro, which we find unpersuasive for the reasons discussed above with respect to claim 1 (Br. 13). Appellants do not argue that Marie fails to teach the use of partial solvolysis of polyvinyl acetate to form polyvinyl alcohol, which control of the extent of solvolysis would have been useful in forming the polyvinyl alcohol of Bugnon. Rather, Appellants urge that Marie does not cure the deficiencies of Bugnon. However, for the reasons advanced above, Appellants have not identified any deficiencies in the combination of Bugnon and Noro.

It follows that we shall affirm the Examiner's rejection of claim 2 over Bugnon, Noro, and Marie.

Claim 6

Dependent claim 6 requires the use of a free radical reaction, an addition reaction, or a condensation reaction to immobilize the polymer on the substrate via crosslinking per claim 5, which latter claim depends from claim 1.

The Examiner has determined without dispute that Bugnon teaches or suggests the use of a crosslinking reaction after the polymer coats the pigment (Ans. 6; Bugnon, p. 3, l. 15 - p. 4, l. 24). Appellants have not persuasively explained why the crosslinking agents disclosed by Bugnon would not crosslink the polymer as part of an addition reaction, free radical reaction, or condensation reaction. In light of the above, we do not burden the record with a further discussion of "Addition Polymerization" as further relied on by the Examiner. In this regard, Appellants have not indicated reversible error in the Examiner's obviousness rejection over Bugnon, Noro

and “Addition Polymerization” by urging that Mark (“Addition Polymerization”) does not teach crosslinking by addition polymerization.

Claims 9 and 15

Representative claim 9 depends from claim 1 and further requires that the substrate is flat and that the polymer has a molar mass ranging from 1,000 to 5,000 g/mol. The Examiner adds Cox to the applied references to teach or suggest the addition of a coating to a relatively flat pigment, namely, aluminum flakes (Ans. 10; Cox, Ex. 8, col. 1, ll. 30-38). Given that Bugnon teaches that a variety of pigments, such as metallic complexes, may be coated with a polymer, the Examiner maintains that it would have been obvious to employ a flat substrate, such as a pigment flakes as the substrate in the coating process of Bugnon, as modified by Noro (Ans. 11).

Appellants argue that Cox does not cure alleged deficiencies of Bugnon with respect to the recited solvolysis deposition (Br. 14-15). This argument is not persuasive because Cox is not relied upon by the Examiner to teach solvolysis. Bugnon taken with Noro teach the claimed solvolysis deposition technique for coating pigment particle substrates, as detailed above and in the Answer.

Accordingly, we shall sustain the Examiner’s obviousness rejection of claims 9 and 15 over Bugnon, Noro, and Cox.

Claim 11

Claim 11 depends from claim 1 and further requires coating the surface of the substrate with a nanolayer of a polymer. The Examiner additionally relies on Herman to teach or suggest a nanolayer thickness coating being applied to a pigment, which thickness of coating, according to

the Examiner, would have been obvious to apply to the pigment particles of Bugnon as evinced by Herman (Ans. 12-13; Herman, Ex. 8, col. 8, ll. 45-48).

Appellants argue that Herman fails to cure the alleged deficiencies of Bugnon and Noro with respect to forming the pigment coating by solvolysis. This argument is not persuasive for the reasons set forth above with respect to the Examiner's obviousness rejection of claim 1 over Bugnon and Noro, in addition to the reasons set forth in the Answer by the Examiner.

It follows that we shall sustain the Examiner's obviousness rejection of claim 11 over Bugnon, Noro and Herman.

CONCLUSION/ORDER

The Examiner's decision to reject claims 1, 3, 4, 5, 7, 8, 10, 12, 14, and 16 under 35 U.S.C. § 102(b) as being anticipated by Bugnon; to reject claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Marie; to reject claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of "Addition Polymerization"; to reject claims 9 and 15 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon and Cox; and to reject claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Herman is reversed.

The Examiner's decision to reject claims 1, 3, 4, 5, 7, 8, 10, 12, 14, and 16 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro; to reject claims 17-20 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and Stamicarbon; to reject claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and Marie; to reject claim 6 under 35 U.S.C. § 103(a) as being

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unpatentable over Bugnon in view of Noro and “Addition Polymerization”; to reject claims 9 and 15 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and Cox; and to reject claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Bugnon in view of Noro and Herman is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

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